

Subchapter 4.1—Interconnect and Fibre Channel

4.1.1—Interconnect

Hewlett-Packard offers SCSI adapters and Fibre Channel bridges to connect mass storage on HP e3000 Servers. HP also supports older mass storage adapter technology like Fiberlink and HP-IB on some older HP e3000 Servers. See **Chapter 8** for networking links.

With MPE/iX Release 7.0, PCI I/O adapters are supported for usage with HP e3000 A- and N-Class Servers. PCI I/O adapters are not supported on releases prior to MPE/iX Release 7.0.

The HP e3000 MPE/iX operating system prior to Release 6.5 supports interface cards for two types of I/O architectures, HP Precision Bus (HP-PB) also known as NIO, and Channel I/O Bus (CIO or CIB). MPE/iX Release 6.5 supports only the HP-PB I/O (NIO) system (CIO/CIB servers will not work with MPE/iX Release 6.5).

Table 4.1.1.1 lists the HP e3000 server storage adapters, the supported servers, and the supported MPE/iX releases.

Table 4.1.1.1 Storage Adapter Server Support

Product Number	Product Name	I/O Bus	A-Class	N-Class	9x7	9x8	9x9KS	99x	MPE/iX Release 7.5	MPE/iX Release 7.0	MPE/iX Release 6.5
SCSI											
A6828A	Single-port, Ultra160 SCSI Adapter	PCI	◆	◆					◆		
A6829A	Dual-port, Ultra160 SCSI Adapter	PCI		◆					◆		
A5149A	Single-port, Ultra2 LVD/SE SCSI Adapter	PCI	◆	◆					◆	◆	
A5150A	Dual-port, Ultra2 LVD/SE SCSI Adapter	PCI		◆					◆	◆	
A4800A	Single-port, Ultra HVD (FWD) SCSI Adapter ¹	PCI	◆	◆					◆	◆	
A5159A	Dual-port, Ultra HVD (FWD) SCSI Adapter ¹	PCI		◆					◆	◆	
A5159B	Dual-port, Ultra HVD (FWD) SCSI Adapter	PCI		◆					◆	◆	
28642A	Single-Ended SCSI ¹	HP-PB			◆	◆	◆	◆	◆	◆	◆
28696A	Fast/Wide/Differential SCSI ¹	HP-PB			◆	◆	◆	◆	◆	◆	◆
28643A	Fiber-optic SCSI Extender ¹	NA			◆	◆	◆	◆			◆
Fibre Channel											
A6795A	PCI 2 Gb Fibre Channel Adapter	PCI	◆	◆					◆		
A5814A	HP SCSI to Fibre Channel Router (see Subchapter 4.6 for details)	NA	◆	◆	◆	◆	◆	◆	◆	◆	◆

¹ Not actively sold and in support life.

SCSI Adapters

SCSI is an ANSI standard bus that allows connection of peripherals such as disks and tapes to a computer system. There are up to 15 available SCSI device addresses on each Host Adapter Card. Most SCSI peripheral devices use one SCSI address.

SCSI peripherals (disks and tapes) can be mixed and matched in any combination on the same SCSI bus as long as the total number of SCSI devices does not exceed seven. However, mixing disks and tapes on the same adapter card is not recommended due to potential performance degradation.

Note: Use of uncertified third-party peripherals is not supported by the MPE/iX operating system and is not supported by HP's standard support process.

See **Table 4.1.1.1** and the server specification tables in **Chapter 2** to determine which SCSI adapters are supported on which HP e3000 Servers, the maximum number of cards supported on each server, and which version of MPE/iX is required.

Comparing SCSI Interfaces

HP e3000 Servers users may choose from three industry-standard I/O interfaces. **Table 4.1.1.2** summarizes the key characteristics of SE, FWD (HVD), and Ultra2 LVD/SE SCSI.

Note: Although Fast/Wide/Differential SCSI and single-ended SCSI are both SCSI-2-compliant, SE devices may not be connected a to FWD SCSI bus.

Table 4.1.1.2 SCSI Capability Matrix

Characteristic	Single-Ended SCSI	Fast/Wide/Differential SCSI	Ultra2 LVD/SE SCSI	Ultra160 SCSI
Other names bus is known by	<ul style="list-style-type: none"> • SE • Standard SCSI • SCSI • SCSI-2 • SE-SCSI 	<ul style="list-style-type: none"> • Differential-Wide • F/W-SCSI • Fast and Wide • FWD - SCSI-2 • HVD • High Voltage Differential SCSI 	<ul style="list-style-type: none"> • LVD • Wide LVD • Multi-mode LVD/SE • Low Voltage Differential 	<ul style="list-style-type: none"> • Ultra3 • LVD • Wide LVD • Multi-mode LVD/SE • Low Voltage Differential
Compatibility with other SCSI bus types	No	No	Single Ended LVD	Ultra2, Ultra, LVD, Single Ended
Maximum bus transfer rate	5 MB/s	20 MB/s	80 MB/s	160 MB/sec
Data bus width	8 bits	16 bits	16 bits	16 bits
Number of connector pins	50	68	68	68
Maximum cable length	6 meters	25 meters	12 meters	12 meters
Maximum connectivity	7 devices	15 devices	15 devices	15 devices

Single-Ended SCSI-2 Adapters

Hewlett Packard offers the HP 28642A Single Ended SCSI Adapter (see **Table 4.1.1.3**) for HP-PB systems (9x7, 9x8, 9x9KS and 99x Servers). For platform support see **Table 4.1.1.1**.

Table 4.1.1.3 HP 28655A Adapter Specifications

Product Number	Specification
HP 28642A	HP-PB Single-Ended SCSI SCSI Port <ul style="list-style-type: none"> • Fully compatible with ANSI X3.131-1990 (SCSI-2) Specification • 8-bit SCSI bus • 3.0 MB/s asynchronous transfer rate • 5.0 MB/s synchronous transfer rate • Parity support (SCSI data only) • Connects up to 7 devices per adapter • Alternative-2 Termination • Maximum cable length is 6 meters

Termination for Single Ended Adapters

Both end points on a SCSI bus must be terminated. The adapter will supply termination to one end of the bus. The other end of the bus must be terminated as well. Use terminators to terminate the peripheral end of the SCSI bus. Single-ended terminators are included with the adapters.

All SE cards do NOT have self-termination. When the card is installed in the system it needs to have terminators attached when not hooked to a properly terminated SCSI chain.

Fast/Wide/Differential SCSI-2 Interfaces

Hewlett Packard offers Fast/Wide/Differential (FWD) (HVD) SCSI adapters for HP-PB and PCI bus servers. These adapters feature 20 MB/s burst speed, and will support up to 15 FWD (HVD) peripherals. For platform support see **Table 4.1.1.4**.

Table 4.1.1.4 Fast/Wide/Differential (HVD) SCSI-2 Adapter Specifications

Product Number	General Description	General Specifications
A4800A	Single-port, Ultra HVD (FWD) SCSI Adapter, PCI bus	<ul style="list-style-type: none"> • SCSI-2 compliant, 16-bit SCSI bus • 20 MB/s burst speed • Parity support • Maximum cable length is 25 meters • Connects up to 15 devices per adapter
A5159A/A5159B	Dual-port, Ultra HVD (FWD) SCSI Adapter, PCI bus	
28696A	Fast/Wide/Differential SCSI (double-high), HP-PB bus	

Restrictions and Limitations

1. Do not connect single-ended SCSI-2 or Ultra2 LVD peripherals to FWD SCSI-2 interface cards. They are not compatible.
2. FWD SCSI-2 interface cards and single-ended SCSI-2 cards may coexist in the same system.
3. FWD SCSI disks and FWD disk arrays may be mixed on the same card.

Fast/Wide/Differential (HVD) SCSI-2 Description

The SCSI address of a device dictates the device’s priority when arbitrating for the SCSI bus. SCSI address “7” is the address for the highest priority device (and is usually reserved for the host). Address “7” is followed in priority (from highest to lowest) by the subsequent addresses 6, 5, 4, 3, 2, 1, 0, 15, 14, 13, 12, 11, 10, 9, and 8. Fast/Wide/Differential (HVD) SCSI disk arrays and Fast/Wide/Differential SCSI disks can be mixed on the same card.

Under extreme I/O workload conditions, it is possible for lower priority devices on a Fast/Wide/Differential (HVD) bus to be “starved” for data throughput and time out. A retry will be automatic.

Similar to single-ended (SE) SCSI, devices on the Fast/Wide/Differential (HVD) SCSI bus are connected to each other in a “daisy chain.” The first and last devices on the SCSI bus must provide proper termination on the bus. A terminator, which fits on a SCSI connector, is shipped with the adapter card and can be used to terminate the last device on the SCSI bus.

FWD (HVD) SCSI Termination and Cabling

Both end points on a SCSI bus must be terminated. The adapter will supply termination to one end of the bus. The other end of the bus must be terminated as well. Use terminators to terminate the peripheral end of the SCSI bus. High-density FWD terminators are included with all the FWD adapters except the A5159A/A5159B.

The A5159A/A5159B is dual ported and has VHDCI connectors. Terminators are not included with the A5159A/A5159B since the final device in the SCSI chain may be HD or VHDCI. Thus the appropriate terminator should be ordered separately and utilized on the final device in the SCSI chain. Currently most FWD devices have HD connectors and in those cases a 68-pin HD HVD terminator should be ordered. That is C2905A: 68-pin HD High Voltage Differential Terminator.

The A5159A/A5159B adapter has self-termination when no cable is attached to the connector. This means that when the card is installed, but no cable is attached, the card does self-termination at the connector. Thus there is no need to add external terminators directly to the card connectors.

All other FWD cards do NOT have self-termination. When the card is installed in the system it needs to have terminators attached when not hooked to a properly terminated SCSI chain. In addition the A4800A must always be terminated on its “internal” SCSI bus connector; a special “low profile” HVD terminator is included with the Card for this purpose.

The Fast/Wide/Differential cards (28698A, A4800A, and A5159A/A5159B) use high voltage differential transceivers that support cable distances up to 25 meters. When considering cable distances, however, all cable distances must be added, including cable from the host to the first storage device, cable consumed within the storage enclosure, and cable from storage device to storage device.

A Fast/Wide/Differential SCSI tower enclosure consumes 1.3 meters of Fast/Wide SCSI cable internally. A rackmount Fast/Wide/Differential SCSI storage enclosure consumes 1.75 meters. A Fast/Wide/Differential SCSI disk array consumes 0.7 meters of cable. Be sure to include these values in your calculations.

There are two types of Fast/Wide/Differential SCSI cables:

1. Standard male-male, 68-pin, high-density cable, which can be used to cable from the host adapter to the first peripheral and from peripheral to peripheral. These cables are available in 0.9-, 2.5-, 5-, and 10-meter lengths.
2. An extender cable, which is also 68-pin high-density, with one male and one female connector. This cable can be used to extend the cable from the adapter to a peripheral or to extend the peripheral-to-peripheral cable. Extender cable lengths available are 2, 5, and 10 meters.

The A5159A/A5159B PCI Dual-port FWD SCSI Adapter uses Very High Density connectors (VHDCI). The cables needed for attaching to VHDCI on the adapter and high-density (HD) on the peripheral are:

- C2361B—1.0-meter 68-pin VHDCI to 68-pin HD Multimode SCSI Cable
- C2362B—2.5-meter 68-pin VHDCI to 68-pin HD Multimode SCSI Cable
- C2365B—5.0-meter 68-pin VHDCI to 68-pin HD Multimode SCSI Cable
- C2363B—10.0-meter 68-pin VHDCI to 68-pin HD Multimode SCSI Cable

Table 4.1.1.5 summarizes the high-density Fast/Wide/Differential SCSI cables that are available.

Table 4.1.1.5. Fast/Wide/Differential (HVD) SCSI Cables

Product Number	Connectors	Purpose	Distance
Standard Cables			
C2911C	male-male	adapter to peripheral, peripheral to peripheral	0.9 meter
C2924C	male-male	adapter to peripheral, peripheral to peripheral	2.5 meter
C7522A	male-male	adapter to peripheral, peripheral to peripheral	10.0 meter
C7532A	male-male	adapter to peripheral, peripheral to peripheral	20.0 meter
Extender Cables			
5181-8690	female-male	extends standard	2.0 meter
5181-8687	female-male	extends standard	5.0 meter
5181-8685	female-male	extends standard	10.0 meter

Ultra160 and Ultra2 Wide/Low Voltage Differential SCSI-3 Interfaces

Hewlett Packard offers Ultra160 and Ultra2 Wide/Low Voltage Differential (LVD/SE) SCSI-3 adapters for PCI bus servers. These adapters feature 160 MB/s or 80 MB/s burst speed and will support up to 15 Ultra160, Ultra2 LVD or SE peripherals.

Note: Although the Ultra160 adapter features 160 MB/s burst speed, MPE/iX only supports a burst speed of 80 MB/s. Additionally, it should be noted that mixing Ultra160/Ultra2 LVD/SE SCSI devices with low speed SE-SCSI devices on the same bus is NOT recommended as this will cause ALL devices to “SLOW” to 5 MB/sec speed. Examples of LDV/SE devices include: DDS4, DLT-8000 (in TA5300), DS2100, DS2300; examples of SE-SCSI devices include DDS-1, DDS-2, DDS-3 tapes, CD and DVD-ROM (includes TA5300 versions of these devices).

Table 4.1.1.6. Ultra160 and Ultra2 Wide LVD/SE SCSI-3 Adapters and Specifications

Product Number	General Description	Specification
Adapters		
A6828A	PCI Ultra160 SCSI Adapter	<ul style="list-style-type: none"> • PCI universal adapter • SCSI-3 compliant • 16-bit SCSI bus • 160 MB/s synchronous • Parity support
A6829A	PCI Dual Channel Ultra160 SCSI Adapter	
A5149A	PCI Ultra2 LVD/SE SCSI Adapter	<ul style="list-style-type: none"> • PCI universal adapter • SCSI-3 compliant • 16-bit SCSI bus • 80 MB/s synchronous • Parity support
A5150A	PCI Dual-port Ultra2 LVD/SE SCSI Adapter	

Table 4.1.1.6. Ultra160 and Ultra2 Wide LVD/SE SCSI-3 Adapters and Specifications (continued)

Product Number	General Description	Specification
Terminators		
C2364A	High-Density (HD) LVD/SE SCSI Terminator	Multimode HDTS68 LVD/SE
C2370A	VHDCI LVD/SE SCSI Terminator	Multimode VHDCITS68 LVD/SE
Cables		
C2361B	1.0-meter 68-pin VHDCI to 68-pin HD Multimode SCSI Cable	LVD/SE
C2362B	2.5-meter 68-pin VHDCI to 68-pin HD Multimode SCSI Cable	LVD/SE
C2365B	5.0-meter 68-pin VHDCI to 68-pin HD Multimode SCSI Cable	LVD/SE
C2363B	10.0-meter 68-pin VHDCI to 68-pin HD Multimode SCSI Cable	LVD only
C2371A	1.0-meter VHDCI to VHDCI Multimode SCSI Cable	LVD/SE
C2372A	2.0-meter VHDCI to VHDCI Multimode SCSI Cable	LVD/SE
C2373A	10.0-meter VHDCI to VHDCI Multimode SCSI Cable	LVD only

Restrictions and Limitations:

1. Do not connect FWD SCSI-2 peripherals to Ultra2 interface cards. They are not compatible. However, Ultra2 interface cards and FWD SCSI-2 interface cards may coexist in the same system.
2. Maximum cable length is 12 meters. Connects up to 15 devices per adapter

The SCSI address of a device dictates the device's priority when arbitrating for the SCSI bus. SCSI address "7" is the address for the highest priority device (and is usually reserved for the host). Address "7" is followed in priority (from highest to lowest) by the subsequent addresses 6, 5, 4, 3, 2, 1, 0, 15, 14, 13, 12, 11, 10, 9, and 8.

Under extreme I/O workload conditions, it is possible for lower priority devices on an Ultra2/Wide/Low Voltage Differential bus to be "starved" for data throughput and time out. A retry will be automatic.

Devices on the Ultra2 SCSI bus are connected to each other in a "daisy chain." The first and last devices on the SCSI bus must provide proper termination on the bus. A terminator, which fits on a SCSI connector, is shipped with the adapter card and can be used to terminate the last device on the SCSI bus.

Ultra2 LVD/SE SCSI Termination

The host adapter supplies termination power. Any or all of the devices on the bus may supply termination power. The first two devices that supply termination power should be located at each end of the SCSI bus. Other devices supplying termination power can be placed anywhere along the bus.

Both end points on a SCSI bus must be terminated. The adapter will supply termination to one end of the bus. The other end of the bus must be terminated as well. Use active terminators as described above to terminate the peripheral end of the SCSI bus. The terminators are not included with the adapter card and need to be purchased separately when needed. Sometimes terminators will come with the SCSI peripheral storage device.

All of the Ultra2 LVD/SE SCSI adapters have self-termination when no cable is attached to the connector. This means that when the card is installed, but no cable is attached, the card does self-termination at the connector. Thus there is no need to add external terminators directly to the card connectors.

SCSI Usage Guidelines

- Power on all SCSI peripherals and make sure they have time to complete their self-test before powering on the System Processor Unit (SPU).
Note: Some devices require termination power to pass the self-test. These devices may fail self-test if they are powered on before the host. If this occurs, the system will still boot up successfully and clear the error on the device.
- Power on all SCSI peripherals that provide termination power first.
- Keep all devices powered on during and after system boot-up.
- Do not add or remove SCSI devices while the system or any SCSI peripheral providing term power is powered on.

Fiber-optic SE-SCSI Extender (not actively sold after January 1, 2000)

The fiber-optic SE-SCSI extender (28643A) overcomes the 6-meter SCSI distance limitation.

Configuration Information

- Multiple Only one HP 5000 high-end printer can be connected to each extender. DDS drives, 1/2-inch tape drives, and 1/2-inch cartridge tape drives can be connected to the extender, although if the tape drives will be used simultaneously, there will be performance implications. SCSI devices cannot be connected between the extender and the host. They may only be connected at the end of the extender.
- Only one extender per SCSI bus.
- The extender is required for HP 5000 printers and is otherwise **only** recommended for customers who **must have greater cabling flexibility** than 6 meters allow.
- Disk drives not supported.

Performance Considerations

- The SCSI extender will affect the performance of the SCSI devices by as much as 50% depending on the extender length and specific peripheral device.
- The extender is available in 50-meter and 100-meter lengths. The 100-meter extender will have a 5%-10% performance degradation from the 50-meter extender.
- HP 5000 printers, DDS drives, 7980S 1/2-inch tape drives, and 1/2-inch cartridge tape drives all have a synchronous interface and therefore should see little performance degradation when connected to the extender.
- HP 28643A includes two extender units, two mounting bracket kits, an installation/reference manual, and a loopback test coupler. Option AFB and AFD add 50 meters and 100 meters of 62.5-/125-mm fiber-optic duplex cable, respectively.

The SCSI extender supports tape boot capability with no degradation of performance.

4.1.2—Fibre Channel

Fibre Channel Device Adapters

With MPE/iX Release 7.5, support has been introduced for the Fibre Channel Device Adapter cards on HP e3000 A/N-Class systems. These PCI-bus based adapter cards provide the ability to connect a Fibre Channel device directly to the HP e3000 system using Fibre Channel cables. Prior to MPE/iX 7.5, HP e3000 systems supported connectivity to Fibre Channel devices only through a SCSI-Fibre Channel Router connected on a PCI-SCSI HVD card or NIO FW-SCSI card. Now with the support for Fibre Channel (FC) adapter cards, the router is no longer needed for A/N-Class systems.

The introduction of support for FC device adapter cards brings the following benefits to HP e3000 customers:

- Simplified connectivity to Fibre Channel devices
- Improved Fibre Channel I/O performance
- Reduced maintenance issues
- Ability to access the entire LUN-range of Fibre Channel devices
- Lower cost of ownership

Fibre Channel Device Adapter Card

The Fibre Channel Device Adapter Card supported on MPE/iX 7.5 for N- and A-Class HP e3000 systems is:

- A6795A—PCI 4X 2 Gb/s Single-port Fibre Channel Adapter

This Fibre Channel adapter card utilizes the Tachyon XL2 chip, the newest member of the Tachyon family product suite of Fibre Channel interface controllers. It operates at 2 Gigabits per second speed in a 4x PCI slot. This adapter card can automatically sense the Fibre Channel link speed to operate at 1 Gb/s or 2 Gb/s, thus enabling it to work with Fibre Channel devices supporting either speed. For further details on these FC adapter cards, see “*HP e3000 Fibre Channel Mass Storage Adapters – Service and User Manual*”.

Since this adapter card is PCI-bus based, it can be supported only on A-class and N-class HP e3000 systems. There will be no support for Fibre Channel Device Adapter cards on the NIO-bus based HP e3000 systems like 9x8, 9x9KS, or 99x systems. These systems would continue to need a SCSI-FC router for connecting to Fibre Channel devices.

It is recommended at least one A6795A should be purchased for every ten active MPE/iX LDEVs. Larger configurations will require devices be spread across multiple cards. The system configuration should be done to also allocate I/O load as evenly as possible across the cards. It is possible that the FC channel may saturate with fewer than ten devices.

Fibre Channel Devices

The following Fibre Channel devices can be connected to A- and N-Class HP e3000 systems through Fibre Channel device adapter cards.

- HP Surestore Disk Array XP48/XP512
- HP Surestore Disk Array XP128/XP1024
- HP StorageWorks Virtual Array 7100/7110

At present, only FC disk array devices are supported with FC adapter cards. There is no support for FC JBOD units such as the FC10 or DS2405. In addition, no tape devices are supported on FC adapter cards.

Fibre Channel Switches

In order to support the Fibre Channel fabric topology and provide wide range of connectivity options for HP e3000 customers, the following Fibre Channel switches are supported with FC adapter cards:

- Brocade 2800 16-port FC Switch
- Brocade 2400 8-port FC Switch
- A7346A—HP FC 1/2 Gbit Entry Switch 8B
- A7347A—HP FC 1/2 Gbit Switch 8B
- A7340A—HP FC 1/2 Gbit Switch 16B

Fibre Channel Hubs

The following Fibre Channel hub products are supported with FC adapter cards on A- and N-class HP e3000 systems.

- HP Surestore Hub S10 (ShortWave)
- HP Surestore Hub L10 (LongWave)

Fibre Channel Topologies

The following Fibre Channel topologies are supported on HP e3000 A- and N-class systems using FC device adapter cards:

- Fabric
- Arbitrated loop (Private and Public)

HP e3000 systems will not support point-to-point topology in actual Fibre Channel sense. However connecting a single FC device to a single host system is still supported, but the setup will behave like a two-node private loop. The host and the device will speak in “private loop” mode rather than in “point-to-point” mode as per Fibre Channel protocol definitions. There is no major difference for customers from the point of view of connectivity.

Cables and Connectors

Fibre optic cables are used to interconnect Fibre Channel adapters, devices, switches and hubs. An optical fibre is made of two parts, the core and cladding, surrounded by a protective coating. The core and the cladding are made as a single piece of glass, but each section has a different index of refraction. The difference in refractive indexes creates a mirror around the core, which causes light entering the core to ricochet off the cladding surface and travel along the core. There are several parameters involved in specifying a cable type. They are:

- **Multimode vs. Single-mode:** Multimode cables are the more common Fibre Channel cables used for short distance connections spanning over few meters. Single-mode cables are used for long distance applications that are longer than a few miles.
- **Duplex vs. Simplex:** Duplex cables allow for simultaneous, bi-directional data transfer allowing devices to receive and send data simultaneously. Simplex cables only consist of one fiber allowing only one-way data transfer. The cables listed below are multimode duplex cables and are used for most common fibre applications.
- **Size:** In a cable description, you will often see a reference to 50/125 or 62.5/125. This refers to the size of the core and the cladding. The most common diameter of the core is 62.5 and 50 micron. A 9-micron diameter may be seen in future technologies. The most common diameter of the cladding is 125 micron.
- **SC vs. LC Connectors:** Fibre Channel cables are plugged to adapter cards and devices through a Gigabit Interface Connector (GBIC) module. The GBIC is a small hot-swappable serial-to-serial connector module that can be used to provide a pluggable media interface for Fibre Channel devices. In recent Fibre Channel products, GBICs have been replaced by Small Form Factor (SFF) optical modules. GBICs provide an SC-type connector while SFFs provide an LC-type connector. The technical specifications for a FC adapter card or device will mention the type of connector supported by it. The Fibre Channel cable used for interconnection should be selected based on the type of connectors it will connect to at either end.

Table 4.1.2.1 Cabling Required for Connecting Fibre Channel Peripherals

Product Number	Description	Fibre Type	Fibre Size	Cable Length
A3583A	Fibre Optic Cable SC/SC Connector	Duplex	50/125	2 meters
A3531A	Fibre Optic Cable SC/SC Connector	Duplex	50/125	16 meters
A3735A	Fibre Optic Cable SC/SC Connector	Duplex	50/125	50 meters
A3736A	Fibre Optic Cable SC/SC Connector	Duplex	50/125	100 meters
C7524A	Fibre Optic Cable LC/LC Connector	Duplex	50/125	2 meters
C7525A	Fibre Optic Cable LC/LC Connector	Duplex	50/125	16 meters
C7526A	Fibre Optic Cable LC/LC Connector	Duplex	50/125	50 meters
C7527A	Fibre Optic Cable LC/LC Connector	Duplex	50/125	200 meters
C7529A	Fibre Optic Cable LC/SC Adapter	Duplex	50/125	2 meters
C7530A	Fibre Optic Cable LC/SC Adapter	Duplex	50/125	16 meters
C7540A	Adapter Kit (includes 2-meter LC/SC adapter and SC F/F coupler)	Duplex	50/125	2-meter adapter
C7534A	Fibre Optic SC F/F coupler			

As an example on choosing the right type of FC cable, let us assume that we are trying to connect the A6795A FC adapter card to a Virtual Array 7100. The A6795A adapter contains an LC-type connector whereas VA7100 device uses an SC-type connector. From the list of cable types in the previous table, we can see that we need to use the LC/SC adapter type cable (C7529A or C7530A) for interconnecting A6795A and VA7100. If a distance of more than 16 meters is needed, then we need to use a combination of C7540A adapter kit along with an SC-SC type cable (A3735A or A3736A).

Further information on choosing FC cables for interconnection can be found in the *Configuration Guide* for the respective *Fibre Channel* devices.

HP SCSI-Fibre Channel Router

HP SCSI-Fibre Channel Extender—A5814A

The HP e3000 SCSI-Fibre Channel Extender is a protocol converter between SCSI and Fibre Channel. Two units are required between the host server and the mass storage device. Two SCSI-FC Extenders make it possible for a host computer which supports HVD (FWD) SCSI based peripherals to use Fibre Channel to move SCSI peripherals beyond the distance constraints of SCSI. Note that Mirrored Disk/iX is NOT supported with disks that are connected via the Extender Router.

HP SCSI-Fibre Channel Fabric Router—A5814A option 003

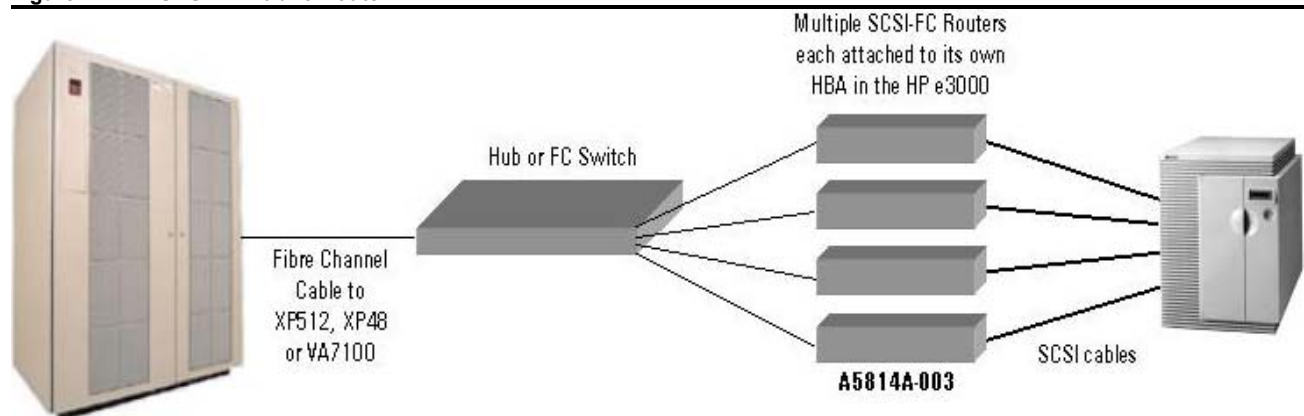
The HP e3000 SCSI-Fibre Channel Fabric Router has the same look and feel as the SCSI-FC Extender but adds storage area network (SAN) connectivity. The SCSI-FC Router allows a HVD (FWD) SCSI host to connect to native Fibre Channel storage. The SCSI-FC Router has one Ultra SCSI-HVD port and one 1-Gb FC port. When a customer needs to connect the HP e3000 to a native Fibre Channel mass storage disk array, the SCSI-FC router is used. Only one SCSI-FC router is required between the host server and the mass storage device. The router can connect directly to the storage or through a A5625A(Z) Brocade 2400 or A5624A(Z) 2800 SilkWorm Fibre Channel Switch or A3724AZ Factory Integrated 10-port Short Wave FC Hub. In addition, the following FC Switches are also supported:

- A7346A—HP FC 1/2 Gbit Entry Switch 8B
- A7347A—HP FC 1/2 Gbit Switch 8B
- A7340A—HP FC 1/2 Gbit Switch 16B

Performance

The HP e3000 supports Ultra SCSI HVD (FWD and Ultra Wide) on the PCI based servers and Fast SCSI on the NIO based servers. Ultra SCSI-HVD has a maximum throughput of 40 MB per second. In a straight Ultra SCSI-HVD environment, HP recommends eight or less SCSI devices attached to the SCSI HBA, based on the customer's OLTP requirements. To support more LUNs, based on performance requirements, multiple SCSI-FC Routers can be connected in parallel. However, they must each be connected to a separate SCSI HBA (see **Figure 4.1.2.1**).

Figure 4.1.2.1 SCSI-FC Fabric Router



Storage Area Network

The SCSI-FC Router has a Fibre Channel output that supports Arbitrated-loop or Fabric connectivity. It is only supported in target mode. Target mode is a point-to-point connection to FC storage devices. The SCSI-FC Router has been certified with A3724A/AZ FC hubs, A5624A/AZ and A5625A/AZ FC switches. In addition, the following FC Switches are also supported:

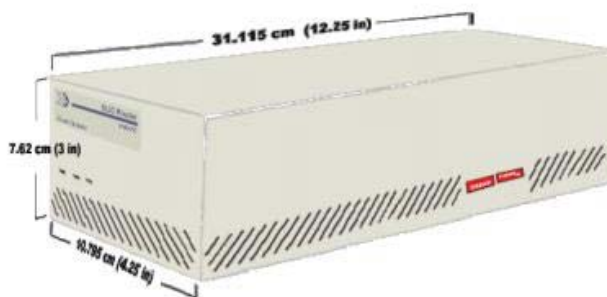
- A7346A—HP FC 1/2 Gbit Entry Switch 8B
- A7347A—HP FC 1/2 Gbit Switch 8B
- A7340A—HP FC 1/2 Gbit Switch 16B

Supported Peripherals

Peripheral	O.S. Release	Distance	Fabric Router
HP Surestore Disk Array XP256 (FC only Option 003)	MPE/iX 6.0 Express 1, MPE/iX 6.5 and MPE/iX 7.0 Express 1		X (FC)
HP Surestore Disk Array XP512 (FC only Option 003)	MPE/iX 6.0 Express 1, MPE/iX 6.5 and MPE/iX 7.0 Express 1		X
HP Surestore Disk Array XP48 (FC only Option 003)	MPE/iX 6.0 Express 1, MPE/iX 6.5 and MPE/iX 7.0 Express 1		X
HP Surestore Disk Array 12H (not supported on Opt. 003)	MPE/iX 6.0 Express 1 and MPE/iX 6.5	X	
HP StorageWorks Disk Array XP128/XP1024	MPE/iX 7.0 Express 1		X
HP StorageWorks Virtual Array 7100/7110	MPE/iX 7.0 Express 1		X
HP Surestore Hub S10	A5814A #003 only		X
HP Brocade Silkworm 2400, 2800	A5814A #003 only		X
HP Entry Switch 8B, Switch 8B, Switch 16B	A5814A #003 only		X

The SCSI-Fibre Channel Extender (SCSI-FC Extender) is a simple to maintain stand-alone SCSI extender. By converting SCSI to Fibre Channel, it can provide lengths of 30 meters (98 feet) to 500 meters (1,633 feet) depending on the fiber optic cable used.

Figure 4.1.2.2 SCSI-FC Router/Extender



To the host, the SCSI-FC Router is transparent and the device on the Fibre Channel loop appears as a SCSI device. Since the SCSI-FC Router appears to the host as a parallel SCSI device, its usage and installation are very simple. The SCSI-FC Router attaches directly to the SCSI host adapter. The SCSI-FC Router is supplied in a self-contained 3-inch (height) × 4.25-inch (width) × 11-inch (depth) enclosure that can either be installed on a desktop or four-abreast in the 19-inch rackmountable Hub Enclosure.

Features

The SCSI-FC Router provides:

- Ease of use
- Fibre Channel distances
- Fast protocol conversion between SCSI and Fibre Channel
- Reliable host to peripheral connection
- FC switch and hub support

System Requirements

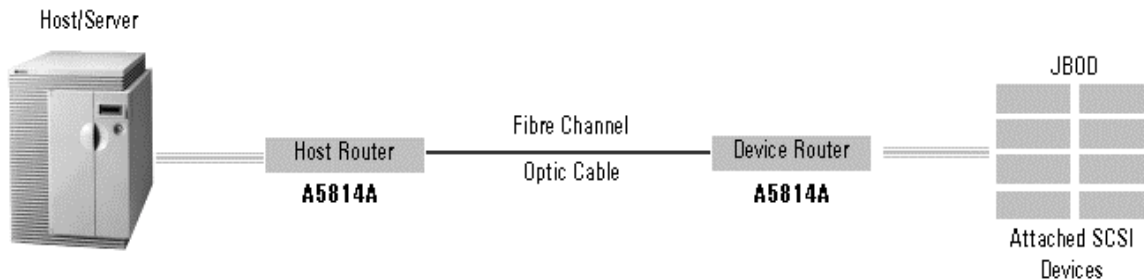
Fibre optic cable: 62- or 50-micron fibre optic cable with dual SC connector, HSSDC Gigabit Interface Converters (GBIC)

- SCSI-FC Extender (host) microcode revision 7.60 or later
- SCSI-FC Extender (device) microcode revision 2.50 or later
- SCSI-FC Fabric Router (host) microcode revision 8.01.0A or later
- SCSI-2 HVD (FWD) compliant host adapter
- SCSI-2 compliant host
- SCSI-2 compliant cabling
- Proper electrical power source. (UPS required for High Availability environments)

SCSI-Fibre Channel Extender Defined

There are two SCSI-FC Extenders in a single Fibre Channel loop. To prevent confusion, the following diagram defines the various SCSI-FC Extenders by their positions within the loop. The SCSI-FC Extender directly attached to the host or the server is the “host router and the SCSI-FC Extender directly connected to the SCSI devices (disk or tape drives) is the “device router.

Figure 4.1.2.3



Applications

The HP e3000 uses two SCSI-FC extenders to provide connectivity between a High Voltage Differential (HVD) SCSI host adapter and SCSI peripherals that need to be supported over distances of 35 meters to 500 meters. It supports the following (SCSI devices):

- HP Surestore Disk Array 12H
- HP Surestore Tape Library Family (DLT-7000, DLT-8000)

Two SCSI-FC routers are required for each application. Short-wave GBICs require 50- or 62.5-micron fibre optic that is orderable through HP or can be custom-made. Long-wave GBICs are not supported. For high availability support, the SCSI-FC router must be connected to a UPS.

Racking

There is a rack kit available for racking the SCSI-FC router. The rack (A5842A) holds up to four SCSI-FC routers at time and is 2 EIA units in height.

Hardware Features

SCSI Connectivity

- Protocol: SCSI-2 Fast/Wide Differential and Ultra-Wide Differential (40 MB/sec); supports either initiator (host) or target (device) protocol.
- Data Transfer Rate: 40 MB/sec (per SCSI-FC Router per SCSI Channel) burst
- SCSI-2: 68-pin high density
- Device Support: 28696A F/W SCSI I/O card
- Supports: Command Processing, Tagged Queuing, Scatter/Gather, Disconnect/Reconnect, Synchronous and Asynchronous data transfer

Fibre Connectivity

- Protocol: ANSI Fibre Channel (FC-PH) and ANSI Fibre Channel Arbitrated Loop (FC-AL)
- Classes of Service: Class 3
- Topology: FC-AL (private), Point-to-Point
- Data Transfer Rate: 100 MB/sec (per SCSI-FC Router per Fibre Channel)
- Port Speed: 100 MB/sec
- Short Wavelength Optical Cable
 - Data Rate: 100 MB/sec burst
 - Cable: 50- or 62.5-micron fibre optic
 - Distance: 500 meters (1640 feet) or 172 meters (564 feet)
 - Connector: Dual SC
- Long Wavelength Optical Cable
 - Data Rate: 100 MB/sec burst
 - Cable: 9 micron fibre optic
 - Distance: 10 km (6.2 miles)
 - Connector: Dual SC

Attachment

- Compatible with HP e3000 Operating Systems MPE/iX 5.5, MPE/iX 6.0, MPE/iX 6.5, and MPE/iX 7.0 Express 1

Technical Specifications

Maintenance

External Serial Port —RJ-11 connector (57 Kbaud rate) Each SCSI-FC router has an external serial port for connecting an NT or Windows workstation too. The serial port is used for configuration, firmware updating and diagnostic troubleshooting. All information is viewed in a GUI format.

Environment

- Operating Temperature: 0°C (32°F) to 40°C (104°F)
- Storage Temperature: -40°C (-40°F) to 75°C (167°F)
- Relative Humidity: 10% to 95% non-condensing

Tabletop

- Dimensions: Height: 7.62 cm (3 in); Width: 10.795 cm (4.25 in); Depth: 31.115 cm (12.25 in); Weight: 1.8 kg (3.97 lbs)

Note: The SCSI-FC Router can also be installed into a rackmountable hub enclosure.

Power

- 100-240 VAC; 50-60 Hz; 0.75-0.50 A

User Interface

- LED indicators

Cable Connections

- A3736A—100-meter Fibre Channel Cable (50uM)
- A3735A—50-meter Fibre Channel Cable (50uM)
- A3531A—16-meter Fibre Channel Cable (50uM)
- A3583A—2-meter Fibre Channel Cable (50uM)

Note: The above cables are available directly from HP. Cable lengths longer than 100 meters may have to be custom-made and are the responsibility of the customer.

- A1658-62024—16-bit F/W Terminator (external)
- 1005-0359—Fibre Channel Loop Back Hood

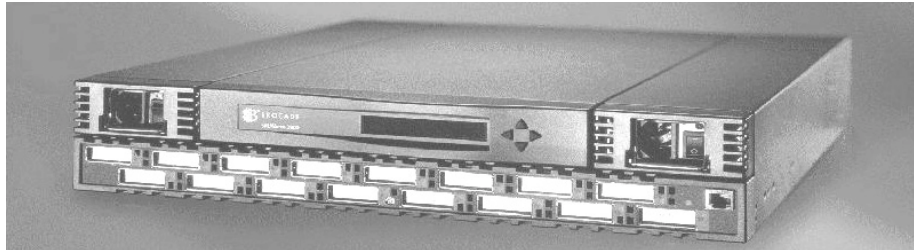
Note: additional information on the SCSI-FC router can be found in the user and Support hand guides. Both guides are available on the web at: DOCS.HP.COM under MPE/iX

HP Fibre Channel Switches

HP FC 1/2GB Entry Switch 8B (A7346A), Switch 8B (A7347A), Switch 16B (A7340A)

See <http://www.hp.com> for information on these products.

Brocade Silksworm 2800 Fibre Channel Switch (A5624A/AZ)



Specifications

Product Number		
A5624A	Standalone Switch with Universal-Port Cards: Includes a rack mount kit for adding the switch to an existing cabinet and an air-duct for cooling	
A5624AZ	• Factory rack-mounted Switch with Universal-Port Cards	
Features		
Fibre Channel protocol	• Fibre Channel ANSI Standard (FC-PH)	
Fabric initialization	• Complies with FC-SW 3.3	
System architecture	• Non-blocking shared memory switch	
Number of Fibre Channel ports	• 16 ports	
Fibre Channel port speed	• 1.0625 Gb/s half duplex; 2.125 Gb/s full duplex	
Modes of operation	• Fibre Channel Class 2 service and Fibre Channel Class 3 connectionless service	
Aggregate switch I/O bandwidth	• 16 Gb/s, full duplex; 16 buffers per port at 2112 bytes per frame	
Latency	• < 2 microseconds with no contention	
Data transmission range	• Up to 500 meters (1625 feet) for short-wave optical link • Up to 10 km for long-wave optical link	
Chassis types	• Back-to-front air flow (power out the front)	
Equipment Cabinets		
A4900A, A4901A, A4902A	• HP Rack 1.25-meter, 1.6-meter, 2.0-meter (HP or Standard EIA rack)	
Fabric Management (Simple Name Server, Alias Server, Brocade Zoning, Telnet, Fibre Channel Manager)		
User Interface	• VFD front panel display, LED indicators, front panel command console, Telnet commands, Fibre Channel Manager, Brocade Web Tools	
Maintenance Port	• RJ-45 front panel connector for 10Base-T Ethernet or in-band	
Dimensions		
	Rackmount	Table Top
Height	2u+, 19-in. (EIA Compliant); 8.73 cm (3.44 inches)	8.73 cm (3.44 inches)
Width	42.86 cm (16.87 inches)	42.86 cm (16.87 inches)
Depth	68.6 cm (27 inches)	52.8 cm (20.8 inches)
Weight	12.94 kg (28.5 pounds)	12.94 kg (28.5 pounds)
Power Supply		
Dual Redundant Internal.	• Nominal voltage of 100-127 and 200-240 VAC • Total input power: 219 watts typical with 16 FL-ports • Input line frequency: 50 to 60 Hz	
Airflow		
Single Hot Swappable Fan Cage. N + 1 redundant Fans with Cage.		
Operating Environment		
Temperature	0°C to 40°C operating; -35°C to 65°C non-operating	
Humidity	5% to 80% non-condensing at 40°C operating; 5% to 90% RH non-condensing at 40° C non-operating	
Altitude	Up to 3 km (9800 feet) operating; up to 4.6 km (15000 feet) non-operating	
Operating environment	Server and network equipment rooms	

Documentation

- A5624-90901—Hewlett-Packard A5624AZ Rackmount Installation Guide
- A5624-90902—Brocade SilkWorm 2800 Hardware Reference Manual
- A5624-90903—Brocade Fabric OS
- A5624-90904—Brocade Zoning Reference Manual
- A5624-90905—Brocade QuickLoop Reference Manual
- A5624-90906—Brocade WebTools User's Guide
- A3724-96010—Hewlett-Packard Fibre Channel Manager Product Announcement Sheet

A5624A/AZ

The Brocade SilkWorm 2800, A5624A/AZ is a cascading gigabit Fibre Channel switch equipped with 16 non-blocking universal ports capable of an aggregate of 16 Gb/s throughput. Universal ports may be configured as e, f, and fl ports. The Brocade switch includes all 16 universal ports and is ordered with any combination of short wave or long wave GBICs (long-wave GBICs are not supported). The A5624A is intended for standalone, field rack mounting, and the A5624AZ is for factory rack mount configurations.

Features

The Brocade switch features high performance and throughput. Millions of transactions per second and 16 GB per second are attainable extending accessibility of current Fibre Channel SAN solutions. Each of the 16 ports operate at a full duplex rate of 200 MB/s. The Switch comes zoning capable to enable a wider support of configurations. Brocade WebTools is an added feature included in the base package for easy management of the Switch capabilities. Fabric capabilities are enabled in the Brocade 2800 base product to support cascading. The Switch features N+1 redundant power supplies and fans. The fans and power supplies are hot swappable. Since the Brocade switch is supported in MC/ServiceGuard configurations it is highly recommended that dual switches be configured when mission critical high availability is needed in the Fibre Channel infrastructure.

Benefits

The Brocade Switch enables previously unattainable levels of scalability and performance in the SAN environment, such as the HP F16 Switch, HP Surestore Hub S10, HP Surestore Hub L10, and the HP Surestore Bridge SCSI 4/2.

Robust centralized SAN Management is enhanced by the Brocade switch's capabilities of instrumenting the SAN links. The Brocade switch monitors each of the 16 links' "health", providing port and device management and error detection and recovery. The Brocade switch is integrated with the HP's SAN Manager software for device management and configuration.

High availability is ensured at the component level via the Brocade switch redundant power supplies and hot-swap fans. At a solution level the Brocade switch is fully certified with HP Cluster/iX.

Configuration Overview

The Brocade switch, A5624A/AZ is very straightforward to configure. The necessary configuration options for this product are:

- Base Switch Product A5624A or A5624AZ
- The number and type of GBICs needed; any mix
- The type of cable desired

The Brocade switch is pre-configured with 16 universal ports and dual redundant power supplies.

Initial Order

Product Number	Description
A5624A/AZ	Base Configuration Chassis including 16 Universal ports, power cord, and rack kit <i>Required: Quantity 1</i>
GBICs	
A5225A	Short Wave GBIC: Quantity 1 <i>Quantity 0 to 16</i>
A5226A (not supported)	Long Wave GBIC: Quantity 1 <i>Quantity 0 to 16</i>
Cables	
A3583A	2-meter cable
A3531A	16-meter cable
A3735A	50-meter cable
A3736A	100-meter cable

Solution Level Configurations of the Brocade Silkworm 2800 Switch

Solution level configurations using the Brocade switch combined with HP 9000 or HP e3000 servers, HP SureSpan Fibre Channel products and HP SureGear Storage Platforms are outside the scope of this document. For more information contact the Technical Response team, TRT at Telnet 447-7070 or refer to the following document.

ESBU Mass Storage Configuration Reference

For online reference of the solution level configurations for all of ESBUs products used with HP 9000 and other servers please refer to the following URL: http://essd.boi.hp.com/essdatc/config_matrix.htm

Please refer to this document for up to date support information as you configure storage solutions.

Support

Support Options

Options	Description
A5624A OS0	License/Next Day System Support-1st Year
A5624A OS1	License/4-hour System Support-1st Year
A5624A OS2	Telephone/Next Day System Support-1st Year
A5624A OS3	4-Hour System Support-1st Year
A5624A OS5	24 x 7 System Support-1st Year
A5624A OS6	24 x 7 System Support-1st Year
A5624A OT1	Critical System Support
A5624A OT2	Critical System Support w/Implementation Assistance
A5624A OT3	Critical Systems Support for additional Systems
A5624A OV1	Critical Systems Support for SAP
A5624A OV2	Critical Systems Support for SAP w/additional maintenance
A5624A OV3	Critical Systems Support for SAP, additional systems
A5624A 3Y0	LTU/Next Day System Support - 3 Year
A5624A 3Y1	LTU/4-hr System Support - 3 Year
A5624A 3Y2	Telephone/Next Day System Support-3 Year
A5624A 3Y3	Telephone/4-hr System Support - 3 Year
A5624A 3Y5	SW LTU; Warranty 24 x 7; Sys Support - 3 Year
A5624A 3Y6	SW Tel; Hardware Warranty 24 x 7; Sys Support - 3 Year

Brocade Silkworm 2400 Fibre Channel Switch (A5625A/AZ and A5667A)



Specifications

Product Number		
A5625A	Standalone Switch with Universal-Port Cards: Includes a rack mount kit for adding the switch to an existing cabinet and an air-duct for cooling	
A5625AZ	• Factory rack-mounted Switch with Universal-Port Cards	
Features		
Fibre Channel protocol	• Fibre Channel ANSI Standard (FC-PH)	
Fabric initialization	• Complies with FC-SW 3.3	
System architecture	• Non-blocking shared memory switch	
Number of Fibre Channel ports	• 8 ports	
Fibre Channel port speed	• 1.0625 Gb/s half duplex; 2.125 Gb/s full duplex	
Modes of operation	• Fibre Channel Class 2 service and Fibre Channel Class 3 connectionless service	
Aggregate switch I/O bandwidth	• 8 Gb/s, full duplex; 16 buffers per port at 2112 bytes per frame	
Latency	• < 2 microseconds with no contention	
Data transmission range	• Up to 500 meters (1625 feet) for short-wave optical link • Up to 10 km for long-wave optical link	
Chassis types	• Back-to-front air flow (power out the front)	
Equipment Cabinets		
A4900A, A4901A, A4902A	• HP Rack 1.25-meter, 1.6-meter, 2.0-meter (HP or Standard EIA rack)	
Fabric Management (Simple Name Server, Alias Server, Brocade Zoning, Telnet, Fibre Channel Manager)		
User Interface	• VFD front panel display, LED indicators, front panel command console, Telnet commands, Fibre Channel Manager, Brocade Web Tools	
Maintenance Port	• RJ-45 front panel connector for 10Base-T Ethernet or in-band	
Dimensions		
	Rackmount	Table Top
Height	1u+, 19-in. (EIA Compliant); 4.34 cm (1.71 inches)	4.34 cm (1.71 inches)
Width	42.86 cm (16.87 inches)	42.86 cm (16.87 inches)
Depth	68.6 cm (27 inches)	45.0 cm (17.72 inches)
Weight	6.36 kg (14 pounds)	6.36 kg (14 pounds)
Power Supply		
Single included with base switch. Redundant Internal power supply available.	• Nominal voltage of 100-127 and 200-240 VAC • Total input power: 110 watts typical with 8 FL-ports • Input line frequency: 50 to 60 Hz	
Airflow		
Single Hot Swappable Fan Cage. N+ 1 redundant Fans with Cage.		
Operating Environment		
Temperature	0°C to 40°C operating; -35°C to 65°C non-operating	
Humidity	5% to 80% non-condensing at 40°C operating; 5% to 90% RH non-condensing at 40° C non-operating	
Altitude	Up to 3 km (9800 feet) operating; up to 4.6 km (15000 feet) non-operating	
Operating environment	Server and network equipment rooms	

Documentation

- A5624-90901—Hewlett-Packard A5624AZ Rackmount Installation Guide
- A5624-90902—Brocade Silkworm 2800 Hardware Reference Manual
- A5624-90903—Brocade Fabric OS
- A5624-90904—Brocade Zoning Reference Manual
- A5624-90905—Brocade QuickLoop Reference Manual
- A5624-90906—Brocade WebTools User's Guide

A5625A/AZ

The Brocade Silkworm 2400, A5625A/AZ are cascading gigabit Fibre Channel switches equipped with 8 non-blocking universal ports capable of an aggregate of 8 Gb/s throughput. Universal ports may be configured as E, F, and FL ports. A5625A/AZ are Enterprise products. The Brocade switch includes all 8 universal ports and is ordered with any combination of short wave or long wave GBICs (long-wave GBICs are not supported) for the Enterprise products and copper or short wave optical GBICs for the Commercial product. The A5625A switch is intended for standalone or field rack mounting, and the A5625AZ is for factory rack mount configurations.

Features

The Brocade switch features high performance and throughput. Millions of transactions per second and 8 GB per second are attainable extending accessibility of current Fibre Channel SAN solutions. Each of the 8 ports operate at a full duplex rate of 200 MB/s. The Switch comes zoning capable to enable a wider support of configurations. Brocade WebTools is an added feature included in the base package for easy management of the Switch capabilities. Fabric capabilities are enabled in the Brocade 2400 base product to support cascading. The Switch features N+1 redundant fans and the option of purchasing a redundant power supply. The fans and power supplies are hot swappable. Since the Brocade switch is supported in MC/ServiceGuard configurations it is highly recommended that dual switches be configured when mission critical high availability is needed in the Fibre Channel infrastructure.

Benefits

The Brocade Switch enables previously unattainable levels of scalability and performance in the SAN environment, such as the HP F16 Switch, HP Surestore Hub S10, HP Surestore Hub L10, and the HP Surestore Bridge SCSI 4/2.

Robust centralized SAN Management is enhanced by the Brocade switch's capabilities of instrumenting the SAN links. The Brocade switch monitors each of the 8 links' "health", providing port and device management and error detection and recovery. The Brocade switch is integrated with the HP's SAN Manager software for device management and configuration.

High availability is ensured at the component level via the Brocade switch redundant power supplies and hot-swap fans. At a solution level the Brocade switch is fully certified with HP Cluster/iX.

Configuration Overview

The Brocade 2400 switches are very straightforward to configure. The necessary configuration options for this product are:

- Base Switch Product A5625A or A5625AZ
- The number and type of GBICs needed; any mix
- The type of cable desired

Initial Order—A5625A/AZ

Product Number	Description
A5625A/AZ Enterprise Channel	Base Configuration 8 Universal ports, power cord, and rack kit <i>(Required: Quantity 1)</i>
Power Supply	
A5671A	Second power supply for redundancy <i>(Quantity 1)</i>
GBICs	
A5225A	Short Wave GBIC: Quantity 1 <i>(Quantity 0 to 8)</i>
A5226A (not supported)	Long Wave GBIC: Quantity 1 <i>(Quantity 0 to 8)</i>
Cables	
A3583A	2-meter cable
A3531A	16-meter cable
A3735A	50-meter cable
A3736A	100-meter cable
GBICs/Cable Kits	
D6980A	2 Optical SW GBICs with one 50-meter optical cable <i>(Quantity 0 to 8)</i>
D6981A	2 Optical SW GBICs with one 100-meter optical cable <i>(Quantity 0 to 8)</i>
D6978A	2 Copper GBICs with one 3-meter copper cable <i>(Quantity 0 to 8)</i>
D6979A	2 Copper GBICs with one 5-meter copper cable <i>(Quantity 0 to 8)</i>
D7080A	2 Copper GBICs with one 10-meter copper cable <i>(Quantity 0 to 8)</i>

Solution Level Configurations of the Brocade Silkworm 2400 Switch

Solution level configurations using the Brocade switch combined with HP 9000 or HP e3000 servers, HP SureSpan Fibre Channel products and HP SureGear Storage Platforms are outside the scope of this document. For more information contact the Technical Response team, TRT at Telnet 447-7070 or refer to the following document.

ESBU Mass Storage Configuration Reference

For online reference of the solution level configurations for all of ESBU's products used with HP 9000 and other servers please refer to the following URL: http://essd.boi.hp.com/essdatc/config_matrix.htm

Please refer to this document for up to date support information as you configure storage solutions.

Support

Support Options—A5625A/AZ

Options	Description
A5624A OS0	License/Next Day System Support-1st Year
A5624A OS1	License/4-hour System Support-1st Year
A5624A OS2	Telephone/Next Day System Support-1st Year
A5624A OS3	4-Hour System Support-1st Year
A5624A OS5	24×7 System Support-1st Year
A5624A OS6	24×7 System Support-1st Year
A5624A OT1	Critical System Support
A5624A OT2	Critical System Support w/Implementation Assistance
A5624A OT3	Critical Systems Support for additional Systems
A5624A OV1	Critical Systems Support for SAP
A5624A OV2	Critical Systems Support for SAP w/additional maintenance
A5624A OV3	Critical Systems Support for SAP, additional systems
A5624A 3Y0	LTU/Next Day System Support - 3 Year
A5624A 3Y1	LTU/4-hr System Support - 3 Year
A5624A 3Y2	Telephone/Next Day System Support-3 Year
A5624A 3Y3	Telephone/4-hr System Support - 3 Year
A5624A 3Y5	SW LTU; Warranty 24×7; Sys Support - 3 Year
A5624A 3Y6	SW Tel; Hardware Warranty 24×7; Sys Support - 3 Year